Psychosocial Influences in Dietary Patterns During Pregnancy

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ABSTRACT

There is increasing evidence that psychosocial factors may affect dietary intakes and health. The current analysis examined the association of six indices of psychosocial well-being with dietary intake during pregnancy. One hundred thirty-four women with low-risk, normal pregnancies participated in a cross-sectional, observational study that assessed dietary intake at 28 weeks' gestation. Psychosocial characteristics, including anxiety, depressed mood, anger, fatigue, social support, and stress were assessed between 24 and 32 weeks' gestation. Pearson product-moment correlations were calculated to determine the relationships between psychosocial factors and diet. Findings suggest that pregnant women who were more fatigued, stressed, and anxious consumed more foods, as evidenced by their increased macronutrient intakes, while appearing to have decreased intakes of some micronutrients. Psychosocial factors should be considered when counseling women regarding diet during pregnancy.


There is increasing evidence that psychosocial factors may affect health through both biological effects and changes in health behaviors (1). Among these, food choices and dietary intakes could be affected by psycho-social factors and lead to poor nutritional status and health. While psychological distress is associated with biological changes that might be expected to reduce food intake (1), experimental studies yield inconsistent results (1-3).

Pregnancy is a period that presents unique stresses that challenge overall psychological adaptation in women. Pregnancy is also a time in which variation in dietary intakes affect health outcomes for both the mother and fetus (4,5). To our knowledge, no studies have examined in a comprehensive manner whether psychosocial factors affect dietary patterns and intakes during pregnancy, although a few have examined how psychosocial factors affect weight gain during pregnancy. While some of these studies suggest that women with negative attitudes or a history of dieting gain excess weight because pregnancy can disinhibit restraint (6,7), others find that higher anxiety, depression, and fewer personal resources are associated with poorer weight gain in adolescents and low-income white, but not African-American, women (8,9).

We have previously reported that well-educated, middle-class women who reported more weight-restrictive behaviors during pregnancy were more anxious, stressed, angry, and felt less uplifted about their pregnancies (5). Here we conduct further analyses with this same population to determine whether features of psychosocial functioning, including anxiety, depressed mood, stress, anger, fatigue, and social support, are associated with variations in dietary patterns during pregnancy. Findings from these analyses may provide fresh insights about factors related to dietary intake during pregnancy and open new avenues for increasing the effectiveness of nutrition programs.

METHODS

The current analysis included 134 nonsmoking, predominantly white (85%), married (94.7%), well-educated women (mean = 16.7, range = 12 to 20 years in school) with low-risk, uncomplicated, singleton pregnancies. These characteristics provided an opportunity to assess relationships independent of significant social and medical risks. A total of 185 participants began the study; 48 were excluded due to development of pregnancy complications, premature delivery, or conditions in the neonate of fetal origin. Dietary data were unavailable for three cases. According to Institute of Medicine guidelines for weight gain, 11% of women in this sample undergained (mean = 14.5 lb), 47% overgained (mean = 42 lb), and 42% gained the amount of weight recommended for their prepregnancy body mass index (BMI) (mean = 29.1 lb).
Subjects were recruited through advertisements placed in local university publications and word-of-mouth to participate in a larger study of factors that influence fetal neurobehavioral development. Psychosocial data collection commenced at 24 weeks' gestation and continued at monthly intervals. Assessment of different features of psychosocial functioning took place at each visit, a schedule designed to minimize participant burden. A food frequency questionnaire was administered at 28 weeks to assess dietary patterns and intakes. The study was observational and thus did not bias maternal attitudes about dietary intake during pregnancy. Study approval was obtained from the Johns Hopkins Institutional Review Board and written consent was obtained at enrollment.

The following instruments were used:

- Health Habits and History Questionnaire (HHHQ) (10), which includes a food frequency questionnaire to estimate usual dietary intake. Its reliability and validity, while not tested in our sample, have been established in a wide range of similar adult populations (10-12). Women were asked about dietary intake with the question, “Since the beginning of your pregnancy, how often have you eaten...?” Respondents reported frequency as daily, weekly, monthly, or during pregnancy, and portion size was recorded as small, medium, or large. Using the HHHQ dietary analysis software, we quantified average daily intakes for 30 nutrients; energy intake from sweets, protein, carbohydrates, fats, and alcohol; and average weekly frequencies for seven food groups.

**Psychosocial Measures:**

- Spielberger State-Trait Anxiety Inventory (13) is a widely validated measure of anxiety. It was administered at 28 weeks’ gestation; higher scores reflect higher levels of anxiety.
- Social support specific to pregnancy (14) was assessed at 28 weeks. An 18-item, 5-point scale was employed to evaluate support; higher scores reflect greater levels of support.
- Pregnancy Experience Scale measures maternal assessment of exposures to potential hassles and uplifts specific to pregnancy. The reliability and validity of this instrument have been established (15). A 4-point scale was used to appraise each item as a hassle and/or an uplift at 32 weeks’ gestation; a ratio variable comparing the frequency was derived to evaluate the relative emotional valence of the pregnancy.
- Profile of Mood States (16) administered at 24 weeks’ gestation measures mood. Three negative affect subscales were used, including depression, anger, and fatigue and were administered at 24 weeks’ gestation; higher scores represent greater negative mood.
- Perceived Stress Scale (17) is one of the most widely used psychological instruments for measuring the perception of stress. It was administered at 28 weeks’ gestation; higher scores reflect higher degrees of perceived stress.
- Marlowe-Crowne Social Desirability Scale (18) measures an individual’s tendency to respond to questionnaires in a socially desirable way through true-false questions that describe both acceptable but improbable behaviors and those deemed unacceptable but probable. It was administered at 36 weeks’ gestation to assess whether this response tendency affected reported psychosocial functioning and dietary intake.

**Statistical Analysis**

Pearson product-moment correlations were calculated to determine the relationships among psychosocial and dietary factors. We also examined the correlations after adjusting for maternal age, parity, BMI, and education using a residual approach. A probability of $P<.05$ was considered statistically significant.

**RESULTS**

According to pregnancy-specific dietary recommendations (19), the majority of participants in this study reported inadequate intakes of iron, folate, and fiber, and excessive intakes of proteins and fats. No significant associations with the Marlowe-Crowne scale were detected ($r$ values ranged from −.14 to .13), indicating that reported dietary intake was not systematically confounded by maternal perception of social desirability of certain food choices.

Two sociodemographic characteristics were significantly associated with psychosocial factors. Increased maternal age was associated with more stress and hassles relative to uplifts during pregnancy. Higher parity was associated with depressed mood, stress, and hassles relative to uplifts during pregnancy, and was negatively associated with social support and partner support. Maternal education and BMI did not correlate significantly with any psychosocial factors.

Variations in dietary intakes were associated with fatigue, stress, and, to a lesser extent, anxiety (Table 1). Women who were more fatigued reported higher intakes of energy, carbohydrates, fats, proteins, and zinc. Conversely, after adjusting for total energy intake, women who reported greater fatigue also reported lower intakes of folate. Stress was associated with higher intakes of energy, fats, proteins, iron, and zinc. Anxiety was negatively associated with intakes of vitamin C, after adjusting for energy intake. Women who were more hassled than uplifted by the pregnancy reported lower intakes of protein.

Associations were also found with intakes by food groups (Table 2). Stress was associated with higher intakes of breads and foods from the fats, oils, sweets, and snack group. Anxiety was associated with higher intakes of foods from the fats, oils, sweets, and snack group. Women who were more hassled than uplifted by the pregnancy reported lower consumption of foods in the meat group.

Findings remained significant after adjusting for maternal age, parity, BMI, and education. No significant relationships were detected for depressed mood, anger, or social support (results not shown).

**DISCUSSION**

Our results indicate that stress, fatigue, and anxiety during pregnancy are associated with increased consump-
tion, particularly in terms of carbohydrates, fats, and protein. Byproducts of this increased consumption include higher intakes of some micronutrients, including iron and zinc. There is some evidence that negative affect is associated with lower folate and vitamin C intake, perhaps mediated by a trend toward lower fruit consumption. Thus, the relation between dietary intake and psychosocial factors during pregnancy is not unlike that previously described for adults in general (1-3,20).

Pregnancy-specific stress was associated with only a single dietary pattern—reduced protein and meat intake. This suggests that the psychosocial effects on diet during pregnancy may be mediated not by stresses particular to pregnancy but reflect more chronic patterns of individual women. However, a caution to this interpretation involves the consistent role that fatigue exerted on intake. Fatigue is a common physical symptom of pregnancy and it is not known whether this measure reflects a transient response or a more persistent characteristic associated with maternal personality.

This study extends knowledge regarding the link between psychosocial factors and eating patterns to pregnancy. The physiologic changes associated with pregnancy may provide additional mechanisms that foster this relationship, in that pregnancy-induced hormones may intensify the relationship between dietary intake and stress. While progesterone increases appetite and enables women to gain needed fat stores early in pregnancy (21), the addition of elevated stress-induced cortisol might lead to higher intakes of energy and sweets (20).

We believe that our findings may underestimate the associations between psychosocial factors and dietary intake. A questionnaire-based approach to ascertain maternal psychological functioning, although common, may generate a variety of response biases. The presence of measurement error in these, as well as the food frequency questionnaire, can produce conservative findings (22). In addition, it is also likely stronger associations would be

### Table 1. Pearson correlations for nutrient intakes of pregnant women with psychosocial measures (N=134)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Fatigue (POMS).userID-11021</th>
<th>Stress (PSS) userID-11021</th>
<th>Anxiety (STAI) userID-11021</th>
<th>Pregnancy hassles/ uplifts (Pregnancy Experience Scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>.24**</td>
<td>.22*</td>
<td>.10</td>
<td>- .12</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>.18*</td>
<td>.12</td>
<td>.04</td>
<td>-.07</td>
</tr>
<tr>
<td>Fats</td>
<td>.23**</td>
<td>.24**</td>
<td>.16</td>
<td>-.14</td>
</tr>
<tr>
<td>Proteins</td>
<td>.23**</td>
<td>.24**</td>
<td>.01</td>
<td>- .19*</td>
</tr>
<tr>
<td>Iron</td>
<td>.06</td>
<td>.21*</td>
<td>.12</td>
<td>.09</td>
</tr>
<tr>
<td>Folate</td>
<td>-.05</td>
<td>.02</td>
<td>-.03</td>
<td>.06</td>
</tr>
<tr>
<td>Zinc</td>
<td>.21*</td>
<td>.24**</td>
<td>.06</td>
<td>-.01</td>
</tr>
<tr>
<td>Calcium</td>
<td>.13</td>
<td>.15</td>
<td>-.02</td>
<td>-.05</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>.002</td>
<td>.15</td>
<td>.03</td>
<td>.05</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>-.01</td>
<td>.02</td>
<td>-.09</td>
<td>-.13</td>
</tr>
<tr>
<td>Fiber</td>
<td>.14</td>
<td>.002</td>
<td>.02</td>
<td>.08</td>
</tr>
</tbody>
</table>

*POMS—Profile of Mood States.
PSS—Perceived Stress Scale.
STAI—Spielberger State-Trait Anxiety Inventory.
Adjusted for total energy intake.
*P<.05.
**P<.01.

### Table 2. Pearson correlations for food group intakes of pregnant women with psychosocial measures (N=134)

<table>
<thead>
<tr>
<th>Food group</th>
<th>Fatigue (POMS) userID-11021</th>
<th>Stress (PSS) userID-11021</th>
<th>Anxiety (STAI) userID-11021</th>
<th>Pregnancy hassles/ uplifts (Pregnancy Experience Scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>.12</td>
<td>.02</td>
<td>-.02</td>
<td>.03</td>
</tr>
<tr>
<td>Fruits</td>
<td>.07</td>
<td>-.02</td>
<td>-.14</td>
<td>-.08</td>
</tr>
<tr>
<td>Breads</td>
<td>.12</td>
<td>.23**</td>
<td>.10</td>
<td>-.04</td>
</tr>
<tr>
<td>Milks</td>
<td>.05</td>
<td>.14</td>
<td>.02</td>
<td>-.06</td>
</tr>
<tr>
<td>Meats</td>
<td>.16</td>
<td>.08</td>
<td>-.02</td>
<td>-.31**</td>
</tr>
<tr>
<td>Fats, oils, sweets, snacks</td>
<td>.04</td>
<td>.18*</td>
<td>.22*</td>
<td>-.06</td>
</tr>
</tbody>
</table>

*POMS—Profile of Mood States.
PSS—Perceived Stress Scale.
STAI—Spielberger State-Trait Anxiety Inventory.
*P<.05.
**P<.01.
found in more heterogeneous populations than the one studied, including low-income populations that often have poorer diets (23) and experience higher levels of stressful life events.

CONCLUSIONS

• The impact of psychosocial characteristics on dietary intake should be discussed during nutrition counseling in pregnant and nonpregnant individuals. Practitioners might use these findings to advocate for better collaboration between health disciplines.

• Our findings suggest that better measures are needed to study the influence of psychosocial functioning on dietary intake. Researchers can use these findings to justify the application of longitudinal designs and non–self-report methods of dietary intake and psychosocial functioning in future studies.

References